

CAPACITANCE TYPE  
LEVEL INDICATOR  
**Model KLI/KLT/KLG**  
**SERIES**



No Moving Part, Easy to Handle!!

Wide measuring span

Cement or the like



Unaffected by dust on pneumatic conveyor

Cement or the like



Unaffected by fouling

Flour or the like



Interfacial detection of two liquids



# CLI/KLT/KLG SERIES

## CAPACITANCE TYPE LEVEL INDICATOR

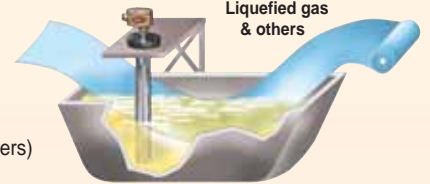
There being no moving part, it reliably operates for a long period of time and its maintenance is easy. Best selling line in continuous measurement.

### Features

- Reliable detection even when objects are being fed.
- It can be applied to anything including powder, granules and liquid.
- Not affected by dust, it can accurately indicate.
- It is possible to select one of the most suitable sensors out of a wide range of products, depending upon the applicable conditions. (high temperature, high pressure, strong acid/ alkali, conductivity, insulation property and others)
- Safely measure a wide span with electrodes designed to be strong enough.
- The intrinsically safe explosion-proof model is also available for use at an explosive area.

Accurate detection of minimal capacitance

Adhesives, Lard (Food oil), Liquefied gas & others



### Operating Principle

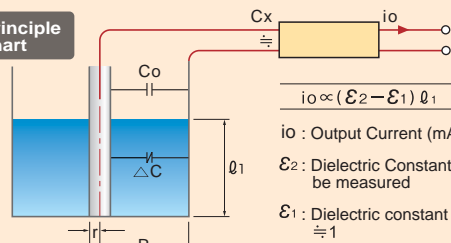
When an electrode is set in a tank so as to be coaxial with its wall as shown below, there forms a capacitance  $C_x$  between the tank and the electrode. By offsetting the stray capacitance of  $C_0$ , when the tank is empty, with a high frequency impedance bridge, it is possible to obtain  $\Delta C$ , namely the output electric signal which is proportional to the height (level)  $l_1$  of the material to be measured.

$$C_x = C_0 + \Delta C$$

$$\Delta C = \frac{K(\epsilon_2 - \epsilon_1) l_1}{\log_{10} (R/r)}$$

( Increment of capacitance when the tank is filled with materials to be measured. )  
 (  $C_0$ : Capacitance when the tank is empty, )  
 (  $K$  = Constant )

### Principle chart



$$i_o \propto (\epsilon_2 - \epsilon_1) l_1$$

$i_o$  : Output Current (mA)

$\epsilon_2$  : Dielectric Constant of material to be measured

$\epsilon_1$  : Dielectric constant of Air  $\approx 1$



model KLI

Agitating vessel  
Liquid, dirt or the like



Electrode / Amplifier  
Remote Type

(Outdoor wall mount)

- Length of Exclusive Cable:  
Max.50m  
(Sensitivity Class1 =Max.25m)
- 24VDC model can be available
- Electrostatic protective model  
can be manufactured.

model KLG

Unaffected by static  
electricity

Resin pellet



Intrinsically safe  
explosion-proof model  
(i)2G4 RIIS No.T44622



- Attached safety barrier
- Exclusive cable : Max.25m

model KLT

Electrode / Amplifier  
Built-in Type

- No exclusive cable is required.
- 24VDC model can be available.

## Applications

Molten resin    Organic solvent

Flour    Food oil    Heavy oil

Sludge    Sulphuric acid    Caustic soda

Industrial water    Fruit juice    Sea water    Waste water

Cement    Grain    Resin pellet

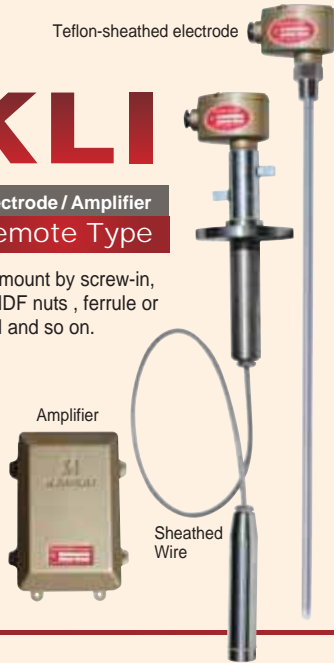
Calcium carbonate    Powdered coal

Metal powder

# KLI

**Electrode / Amplifier  
Remote Type**

Can mount by screw-in, with IDF nuts, ferrule or ANSI and so on.



### Electrode, Specification

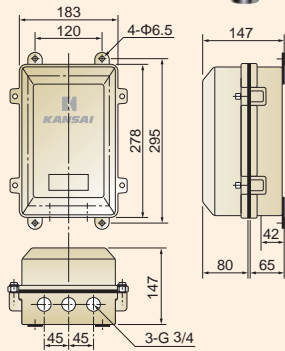
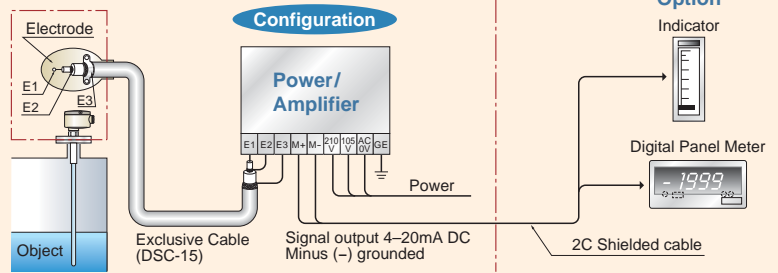
**Permissibly Distributed Capacitance** : 0 – 400pF (Depending on shape)

**Allowable Temperature** : -25 – +80°C (Standard)  
-200 – +500°C (Special)

**Allowable Pressure** : 1MPa (10kg/cm<sup>2</sup>) (Standard)

**Enclosure Rating** : IP-67

**Color** : Hammer-net gold



### Power/Amplifier, Specification (Outdoor wall mounting)

**Input Power Source** : 105/210VAC ±15% 50/60Hz (24VDC OK)

**Power Consumption** : 4VA

**Output Signal** : 4 – 20mA DC, (500Ω Max) (-) grounded

**Measuring Sensitivity** : 10pF, 30pF, 300pF, 3000pF (F-S)

**Accuracy** : (Amplifier) 1%

**Weight** : 6.5Kg (Outdoor use)

**Box Type** : Outdoor Wall mounting or Panel built-in

**Length of Exclusive Cable** : Max. 50m (Sensitivity Class1=Max.25m)

**Allowable Temperature** : -20 – +70°C

**Enclosure Rating** : IP-67

**Color** : Hammer-net gold

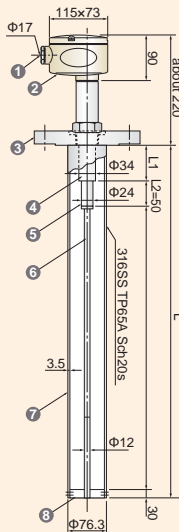
\*Compact amplifier (panel mounting) is optionally available.

## Specifications & Dimensions

\*Below is a standard specifications and dimensions. Please contact your local sales agent for special specifications, such as heat-resistant and/or pressure-resistant specifications.

### KLI-1□3 Special B31-Z-SP-65

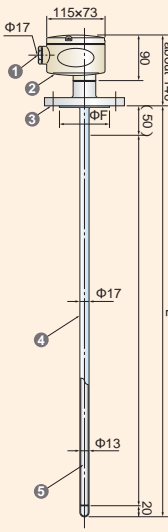
Mounting : JPI300#3B  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 4m



- ① Cable Gland C3604
- ② Housing AC4B
- ③ Flange 316SS
- ④ Earth electrode 316SS
- ⑤ Insulator Ceramic
- ⑥ Main electrode 316SS
- ⑦ Auxiliary electrode 316SS
- ⑧ Insulator supporter Teflon

### KLI-2□3 K-P2-17

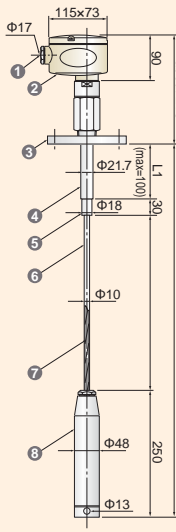
Mounting : JIS10K50A  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 4m



- ① Cable gland C3604
- ② Housing AC4B
- ③ Flange 304SS
- ④ Sheath Teflon
- ⑤ Main electrode 304SS

### KLI-4□3 K-W-10P-(G)

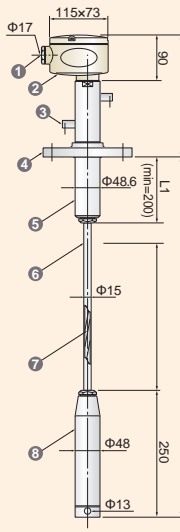
Mounting : JIS10K65A  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 15mm



- ① Cable gland C3604
- ② Housing AC4B
- ③ Flange 304SS
- ④ Earth electrode 304SS
- ⑤ Insulator Polyacetal
- ⑥ Sheathed Teflon
- ⑦ Main electrode wire 304SS
- ⑧ Weight 304SS

### KLI-4□3 K-W-15P-3

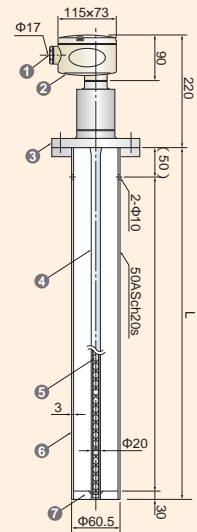
Mounting : JIS10K65A  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 30m



- ① Cable gland C3604
- ② Housing AC4B
- ③ Vent SS400
- ④ Flange 304SS
- ⑤ Earth electrode 304SS
- ⑥ Sheath Teflon
- ⑦ Main electrode wire 304SS
- ⑧ Weight 304SS

### KLI-6□3 Pyrex K-P1-20-SP (50A)

Mounting : JIS10K65A  
Temperature : -20 to +200°C  
Pressure : 2MPa  
Length of L : Max 1m



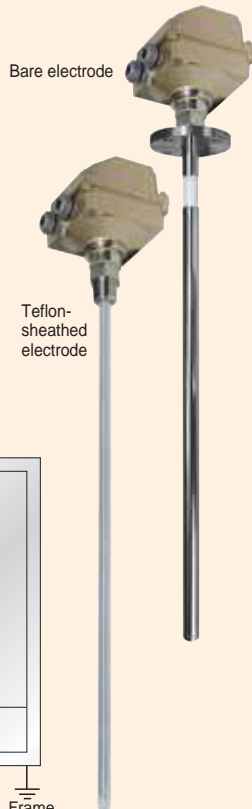
- ① Cable gland C3604
- ② Housing AC4B
- ③ Flange 304SS
- ④ Sheath Pyrex
- ⑤ Main electrode 304SS
- ⑥ Auxiliary electrode 304SS
- ⑦ Main electrode supporter Teflon



# KLT

## Electrode / Amplifier Built-in Type

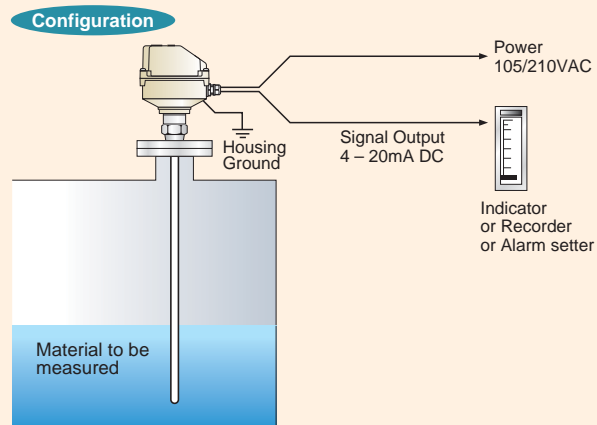
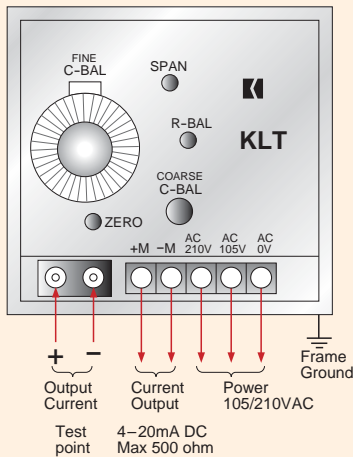
Can mount by screw-in,  
with IDF nuts, ferrule or  
ANSI and so on.



## Standard Specification

- Input Power Source** : 105 /210VAC ±15% 50/60Hz (24VDC OK)
- Power Consumption** : 4VA
- Output Signal** : 4 – 20mA DC, (500Ω Max) Minus (–) grounded
- Measuring Sensitivity** : 10pF, 30pF, 300pF, 3000pF (F, S)
- Accuracy** : 1%
- Permissibly Distributed Capacitance** : 0 – 400pF (Depending on shape)
- Allowable Temperature** : -25 – +80°C (Standard)  
-200 – +500°C (Special)
- Maximum Pressure** : 1MPa (10kgf /cm<sup>2</sup>) (Standard)
- Enclosure Rating** : IP-67
- Color** : Hammer-net gold

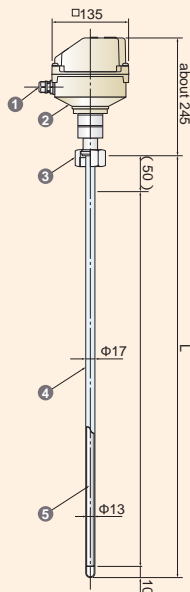
## Wiring Diagram



## Specifications & Dimensions \*Below is a standard specifications and dimensions. Please contact your local sales agent for special specifications, such as heat-resistant and/or pressure-resistant specifications.

### KLT-2□□ T-P1-17-IN2S

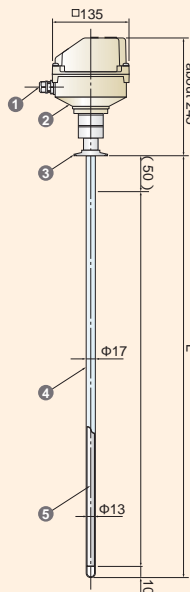
Mounting : IDF2s  
Temperature : -20 to +50°C  
Pressure : 300kPa  
Length of L : Max 4m



- |                  |            |
|------------------|------------|
| 1 Cable gland    | Polyacetal |
| 2 Housing        | ADC        |
| 3 IDF Union nut  | 304SS      |
| 4 Sheath         | Teflon     |
| 5 Main electrode | 304SS      |

### KLT-2□□ T-P1-17-IF2S

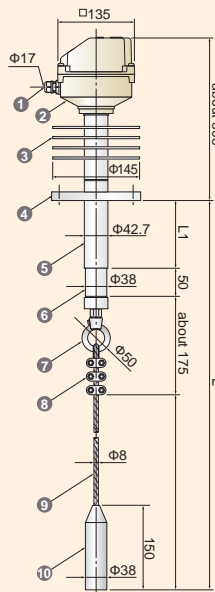
Mounting : IDF2s  
Temperature : -20 to +50°C  
Pressure : 1MPa  
Length of L : Max 4m



- |                  |            |
|------------------|------------|
| 1 Cable gland    | Polyacetal |
| 2 Housing        | ADC        |
| 3 IDF Ferrule    | 304SS      |
| 4 Sheath         | Teflon     |
| 5 Main electrode | 304SS      |

### KLT-3□□O-H Special T-W8-B3-H3

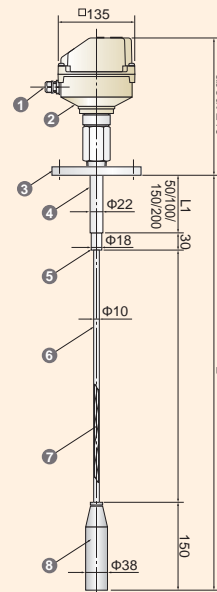
Mounting : JIS10K50A  
Temperature : -20 to +400°C  
Pressure : 1MPa  
Length of L : Max15m



- |                   |            |
|-------------------|------------|
| 1 Cable gland     | Polyacetal |
| 2 Housing         | ADC        |
| 3 Fin             | AC         |
| 4 Flange          | 304SS      |
| 5 Earth electrode | 304SS      |
| 6 Insulator       | Ceramic    |
| 7 Eye nut         | 304SS      |
| 8 Wire clip       | 304SS      |
| 9 Main electrode  | 304SS      |
| 10 Weight         | 304SS      |

### KLT-4□□ T-W-10P-L

Mounting : JIS5K50A  
Temperature : -20 to +50°C  
Pressure : 1MPa  
Length of L : Max15m

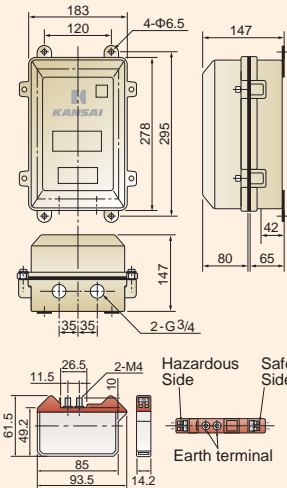
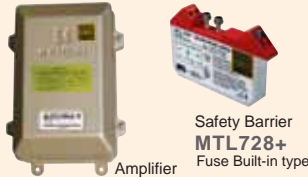


- |                       |            |
|-----------------------|------------|
| 1 Cable gland         | Polyacetal |
| 2 Housing             | ADC        |
| 3 Flange              | 304SS      |
| 4 Earth electrode     | 304SS      |
| 5 Insulator           | Polyacetal |
| 6 Sheath              | Teflon     |
| 7 Main electrode wire | 304SS      |
| 8 Weight              | 304SS      |

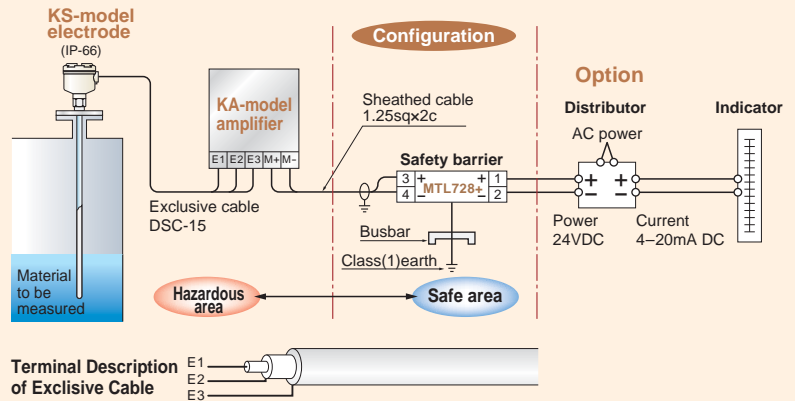
# KLG

**Intrinsically safe explosion-proof model (i)2G4 RIIS No.T44622**

For Hazardous Gas Environment  
Explosion-proof available  
Certified by Industry Safety-Technology Association, Labor Ministry.



**Can safely be used at any explosive environment.**

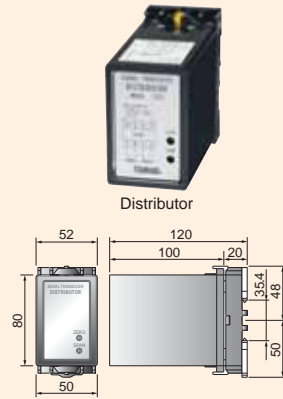


### Amplifier, Specification

- Power Consumption : 4 VA
- Output Signal : 4 – 20mA DC (100Ω Max)
- Measuring Sensitivity : 130pF, 300pF, 3000pF
- Accuracy : (Amplifier) 1%
- Weight : 6.0 kg
- Housing : Outdoor Wall mounting
- Length of Exclusive Cable : Max.25 m
- Enclosure Rating : IP-67
- Painting Color : Hammer-net gold

### Power, Specification (Option)

- Distributor: 100 /110VAC or 200 /220V
- Allowable load resistance 600Ω Max (Using Model 7552 made by Tsuruga Electric Corp.)

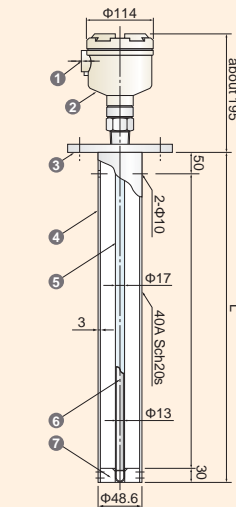


## Specifications & Dimensions

\*Below is a standard specifications and dimensions. Please contact your local sales agent for special specifications, such as heat-resistant and/or pressure-resistant specifications.

### KLG-2□3 G-P1-17-SP(40A)

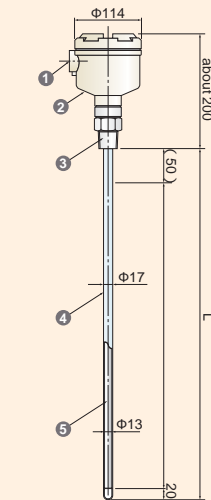
Mounting : JIS10K50A  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 4m



- 1 Cable gland G 3/4
- 2 Housing ADC
- 3 Flange 304SS
- 4 Auxiliary electrode 304SS
- 5 Sheath Teflon
- 6 Main electrode 304SS
- 7 Main electrode supporter Teflon

### KLG-2□3 G-P1-17

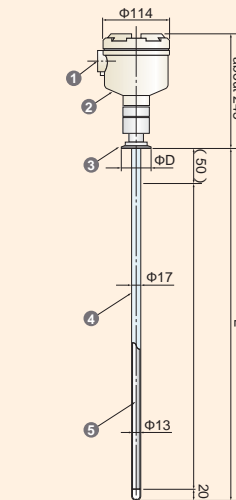
Mounting : R1  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 4m



- 1 Cable gland G 3/4
- 2 Housing ADC
- 3 Screw 304SS
- 4 Sheath Teflon
- 5 Main electrode 304SS

### KLG-2□3 G-P1-17-IF-1S

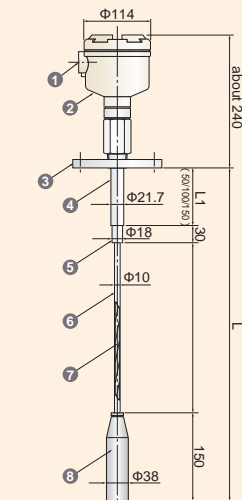
Mounting : IDF ferrule 1S  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 4m



- 1 Cable gland G 3/4
- 2 Housing ADC
- 3 IDF Ferrule 304SS
- 4 Sheath Teflon
- 5 Main electrode 304SS

### KLG-4□3 G-W-10P-L

Mounting : JIS10K50A  
Temperature : -20 to +80°C  
Pressure : 1MPa  
Length of L : Max 15m



- 1 Cable gland G 3/4
- 2 Housing ADC
- 3 Flange 304SS
- 4 Earth electrode 304SS
- 5 Insulator Polyacetal
- 6 Sheath Teflon
- 7 Main electrode wire 304SS
- 8 Weight 304SS

## Optional Units



### Meter Relay LV1000-AI-A2

Power supply : AC85 to 264V (50/60Hz)  
DC12 to 24V ±10%

Power consumption : Max 22VA (Option 10W)

Sensor supply voltage : DC24V (150mA)

Analog Current Output : DC4 to 20mA  
(Resistance load Max.500Ω)

Analog Current Input : DC4 to 20mA  
(Input resistance 250Ω)

Contact capacity : AC250V 0.3A  
(Resistance load)  
DC30V 2A  
(Resistance load) Max 60w

Linearization function : 20 points

Alarm contact output : 2c

### Safety Barriers MTL728+

Approval Proof : Intrinsically Safe 2G4  
Safety Discription : Intrinsically Safe circuit

Max Volts 28V  
Max Current 93mA  
Max Power 650mW

Intrinsically Safe Circuit  
Permissible Volts 250VAC  
250VDC

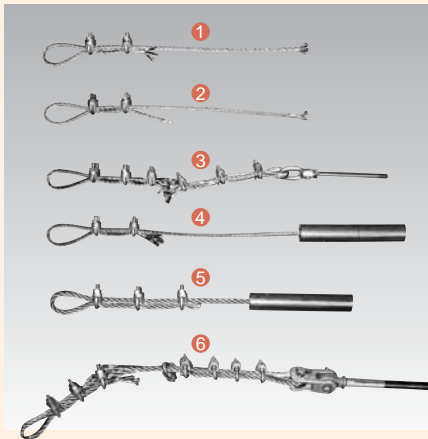


CSA  
Intrinsically safe

CSA:Class , Groups A,  
B,C,D; Class ,Groups  
E,F,G; Class ;T3C

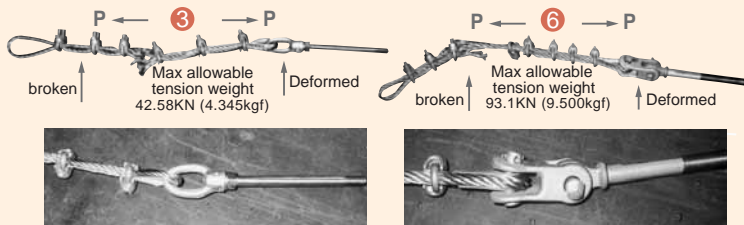
Permissible Capacitance : 0.047μF  
Permissible Inductance : 2.75mH  
Working Volts : 25.5VDC  
Working Current : 50mADC  
Temperature : 60

## Tension Test Osaka Prefectural Industry Technology Research, 2/24/84



### Name of parts for tension test

- ① Φ8 wire rope at lead brazing
- ② Φ8 wire rope/ prevent falling
- ③ Φ8 wire rope/ eyenut
- ④ Φ8 wire rope/ bob base
- ⑤ Φ12 wire rope/ bob base
- ⑥ Φ12 wire rope/ eyebolt



### ③ Description of Deformed Part

The eyenut ring ovalizes but does not crack. No exception is noted on the screw-thread part of stainless steel bar.

### ③ 8 Wire

Eyent Method, An eyenut and a heart thimble deform but withstand any breakage. The withstanding weight is 4.345 tons. The official tension shear weight of the wire is 4.13 tons.

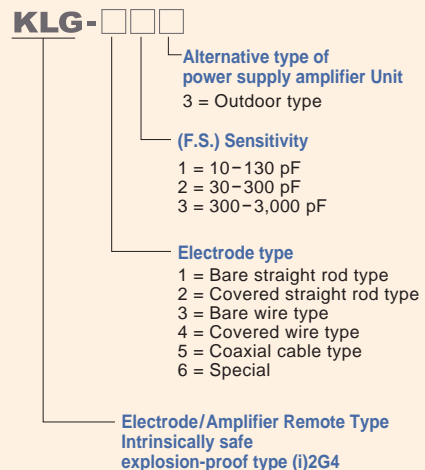
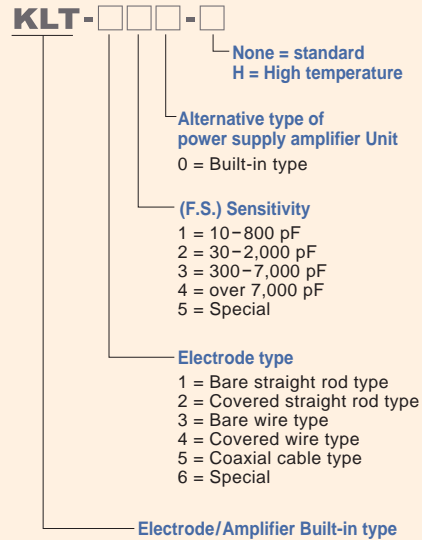
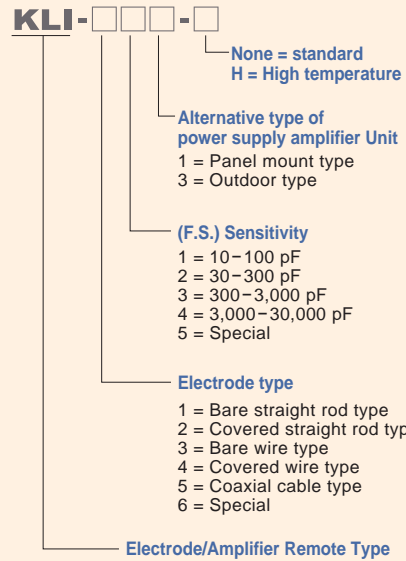
### ⑥ Eyebolt Portion of Φ12 Wire

A right-angled crevice and a heart thimble deform but withstand any breakage. The withstanding weight is 9.5 tons. The official tension shear weight of the wire is 9.48tons.

### ⑥ Description of Deformed Part

Two pins of right-angled crevice, the lower half of the crevice and a pin-hole of the eyebolt as well as a heart thimble were metamorphosed. The left pin and the lower half of the crevice were severely damaged. The right pin and the eyebolt hole were metamorphosed by about 1mm.

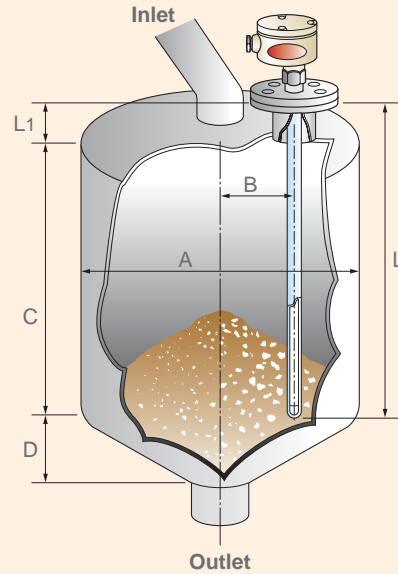
## Type Designation



\*As for the model of "Pyrex" and "Special", please check with our Sales staff.

## Please inform us of the following when inquiring and ordering

1. Name of material to be measured	[	]
2. Dielectric constant, Specific resistance	[	]
3. Granularity	[	]
4. Viscosity / Agglomerating Nature	[ Yes • No	]
5. Corrosive Nature	[ Yes • No	]
6. Foamy Nature	[ Yes • No	]
7. Tank Material	[	]
8. Tank Shape ( 1.Circular, 2.Square )	[	]
9. Agitator	[ Yes • No	]
10. Service Temperature / °C	[	°C
11. Service Pressure / Pa	[	Pa
12. Length of Exclusive Cable (attachment)	[	]
13. Type of Amplifier Housing	[	]
14. Indicator and other ancillary equip.	[ Yes • No	]



### Caution

You may come across some indication errors under the varied conditions as follows:

1. Varied water content of a material to be measured
2. Varied dielectric constant of a material to be measured
3. Varied particle size of a material to be measured

### ■ Fill out the following blanks:

A Tank Diameter	[	]
B Instrument Location	[	]
L Length of Electrode	[	]
L1 Height of Nozzle installed	[	]
ℓ Measuring Span	[	]
C Height of Tank's Cylindrical Part	[	]
D Height of Tank's Conical Part	[	]

### Line of business

- Rotary Paddle Type Level Switch
- Vibration Type Level Switch
- Swing Type Level Switch
- Acoustic Level Switch
- Capacitance Type Level Switch
- Capacitive Proximity Sensor
- Capacitance Type Level Indicator
- Diaphragm Type Level Switch
- Tilt Switch
- Leak Type Level Switch
- Microwave Switch
- Sounding Bob Type Level Indicator
- Flow Switch
- Conductance Type Level Switch
- Float Switch
- Float Type Level Indicator
- Ultrasonic Type Level Indicator
- Equipments For Conveyor Lines
- Dust Monitor System
- Zirconia Oxygen Analyzer
- Laser Type Level Indicator
- RADAR Type Level Indicator
- On-line Sensors for Accurate Liquid Analysis
- Ultrasonic Flow meter

\*Please be sure to read USER'S GUIDE, Installation & Operation Instructions before using the instrument.

\*The specifications herein may be subject to change without advance notice.

All-round Manufacturer of Level Controllers for Powder, Granules and Liquid

**KANSAI Automation Co., Ltd.**

#### Headquarters :

2-14, Togano-cho, Kita-ku, Osaka 530-0056, Japan  
 TEL. 81-6-6312-2071 FAX. 81-6-6314-0848  
 e-mail: info@kansai-automation.co.jp

<http://www.kansai-automation.co.jp>



**Tokyo Branch :** 1-29-6, Hamamatsu-cho, Minato-ku, Tokyo 105-0013, Japan  
 TEL. 81-3-5777-6931 FAX. 81-3-5777-6933

**Nagoya Office :** 3-31-27, Uchiyama, Chigusa-ku, Nagoya 464-0075, Japan  
 TEL. 81-52-741-2432 FAX. 81-52-741-1588

**Kyushu Office :** 1-2-39, Asano, Kokura Kita-ku, Kitakyushu 802-0001, Japan  
 TEL. 81-93-511-4741 FAX. 81-93-511-4580

Agent